

PAS 128 SURVEY REPORT

INGFIELD MANOR SCHOOL
BILLINGHURST
RH14 9AX

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Prepared for
Elmcroft Construction



Contents

1. Introduction	2
1.2. Survey Area	3
1.3. Deliverables.....	3
2. Detection Methods	3
2.1. Electromagnetic Location (EML) Survey Method	3
2.2. EML Known Limitations.....	4
2.3. Appraisal of EML Results.....	4
2.4. Ground Penetrating Radar (GPR) Survey Method.....	5
2.5. GPR Known Limitations	5
2.6. Appraisal of GPR Results	5
2.7. Detection Method Table	6
3. Survey Outcomes	7
3.1. Planimetric Information, Metadata and Attribute Data	7
3.2. Appraisal of Survey Results Per Service Type	8
3.3. Appraisal of Desktop Utility Records	9
3.4. Site Specific Conditions and Survey Limitations	10
3.5. GPR Buried Features and Obstructions	10
3.6. Conclusions and Recommendations	10
4. Cautionary Notes	10
5. Supporting Images/ Documents	12



1. Introduction

This report outlines the utility survey methods used and draws conclusions to the success or otherwise of the survey results. This document is designed to be read in conjunction with the survey deliverables; aiming to clarify any issues, inform our clients and offer recommendations of where further survey work or verification may be needed.

1.1. Scope of Works

SVS Ltd. were instructed by their client Elmcroft Construction to undertake a PAS-128 within a predetermined survey boundary at Ingfield Manor School in Billingshurst.

The survey was conducted to establish accurate position and depth of buried services that exist within the specified survey area by:

- Statutory Record / Guide drawing verification
- Visual identification
- Access gained to manhole and inspection chambers
- Electro-magnetic location
- Ground Penetrating Radar acquisition

Utility location data was recorded using GNSS and/or Total Station and tied into a topographical baseplan supplied by Elmcroft Construction. In some circumstances, utility locations may be recorded by creating a to-scale drawing onsite and transferring the information to the baseplan.

All located / identified utilities were marked on the ground using either wax marker or temporary site marking paint and sub categorised to the relevant quality level dependant on the accuracy of the location. The quality levels associated with a PAS128 QL-B survey are listed within section 3.1 of this report.

This report is to be read in conjunction with planimetric information supplied by Site Vision Surveys Ltd. drawing number: 0126-ECC-18160.

1.2. Survey Area

Yellow highlighted area.



1.3. Deliverables

	Drawing Name	Content	Filetype	Date Issued	Authorised by
No. 1	0126-ECC-18160	2D Utility Survey	.dwg CAD file	13-02-2026	NC
No. 2	0126-ECC-18160	2D Utility Survey	PDF	13-02-2026	NC

2. Detection Methods

2.1. Electromagnetic Location (EML) Survey Method

Electromagnetic Location technology was used to locate the majority of metallic buried pipes and cables within the defined survey boundary by detecting radiating electromagnetic signals emitting from conductive materials.

The EML kit comprises of a signal emitting transmitter and handheld receiver, the former used to transmit signals which are then received by the handheld receiver. The handheld receiver is also capable of detecting signals without the use of the transmitter, this is referred to as passive location.

The three main EML detection methods and descriptions are as follows:

Passive Detection

This refers to the detection of electromagnetic signals emitting from conductive materials which are energized by nearby power/radio sources, these signals are picked up using the handheld receiver only.

Signal Generation

The transmitter is placed over a suspected conductive property, emitting a set signal, and detected using the handheld receiver.

Direct Connection

This is the process of connecting the transmitter directly to a service or service feature using a direct connection lead and/or signal clamp.

All the above techniques were deployed on this project; direct connection was used to trace all encountered conductive services from above or below ground apparatus such as manholes, inspection chambers, lamp posts, valves, hydrants etc. Empty ducts/nonconductive service ducts were located by inserting a flexible tracing wire into the ducting, connecting the transmitter to the tracing wire apparatus, and locating the ducting from above ground. Passive detection checks were conducted to search the area for conductive utilities, results were induced using signal generation techniques and if possible, traced. In addition, signal generation checks were carried out across the survey area. All located utilities were marked on the grounds surface using wax marker or temporary site marking paint, prior to being geographically positioned by GNSS and/or Total Station, unless stated otherwise.

The relevant detection method(s) were selected based upon the environment and/or density of services as outlined within 'Table 2 – Detection Methods' of the PAS128:2022 document, unless specified by the client. Please see section 2.7. of this report for a supporting list of the detection methods and their typical application. All techniques were deployed providing areas were accessible, free of debris, obstruction and where ground conditions would allow; any areas that were unable to be surveyed have been clearly marked or noted on the supplied survey drawing.

2.2. EML Known Limitations

- Unable to detect non-conductive/metallic utilities.
- Unable to determine whether a utility is live or redundant.
- May not detect well balanced or pot ended/cut cables.
- May not be able to determine if a utility is singular or several in close proximity.
- Depth indications are subject to ground conditions, as a rule, we would not expect to accurately locate services beyond 2.50m deep.
- Signals are prone to interference, particularly when conductive materials are within close proximity to each other, this can sometimes lead to a poor trace.

2.3. Appraisal of EML Results

This project was performed using multiple detection methods. M2 was conducted on areas where the density of services was typical of an undeveloped area such as the surrounding forest sections, whereas M3P was conducted around the buildings as the potential of more prevalent services was higher. Electric, unknowns and foul/surface water drainage were all identified on this site using direct connection, passive sweeps and signal generation. No gas or water was located, however, there were oil tanks next to every building so believe there are no gas feeds to locate.

2.4. Ground Penetrating Radar (GPR) Survey Method

GPR was deployed in an attempt to locate any non-conductive pipes/cables, locate conductive pipes/cables not located via EML and upgrade the quality level of already established electromagnetic locates.

GPR transmits high frequency, short duration pulses of energy into the ground from a coupled antenna. Transient electromagnetic waves are reflected, refracted, and diffracted to create a high-resolution, cross-sectional image of the grounds subsurface. This geophysical data alone does not allow for the identification of subsurface utilities, the identification of utilities is achieved through a combination of on-site interpretation from both GPR and EML surveys together with on-site reconnaissance and correlation to statutory utility records.

It is possible that GPR may detect buried features and obstructions beyond utilities. The type of features that can be detected include, but are not limited to voids, foundations, thrust blocks, tanks, chambers, basement extents, ducts (not linked to any street furniture); and reinforced concrete. Where the purpose of the survey is to identify and record such features, the survey should be undertaken in accordance with BS 5930.

On this project, GPR was deployed across the specified survey boundary in all accessible areas free of debris, obstruction and where ground conditions would allow. In addition, GPR was deployed in targeted areas of concern or where statutory utility records indicate the location of a service and/or services. Each significant GPR locate was marked on the grounds surface using wax marker or temporary site marking paint, prior to being geographically positioned by GNSS and/or Total Station, unless stated otherwise. If the relevant detection method(s) required GPR post-processing, the data was collected, stored and then post-processed at a later date. The relevant detection method(s) were selected based upon the environment and/or density of services as outlined within 'Table 2 – Detection Methods' of the PAS128:2022 document, unless specified by the client. Please see section 2.7. of this report for a supporting list of the detection methods and their typical application. Any areas that were unable to be surveyed have been clearly marked or noted on the supplied survey drawing.

2.5. GPR Known Limitations

- Generally, GPR is unable to detect services with a diameter that is less than 10% of their depth. Therefore, deep services, small diameter pipes and un-ducted cables may not be detectable.
- Ground conditions such as wet clay, reinforced concrete, foam filled concrete etc. will limit the GPR signal penetration and greatly reduce its detection capability.
- Uneven terrain can affect GPR results.
- Utility identification is not always possible using geophysical data alone.
- Unable to accurately determine sizes of detected utilities.

2.6. Appraisal of GPR Results

The GPR could not be deployed on this area of site as it was heavily overgrown. The sections that weren't overgrown were extremely muddy due to excessive rainfall

2.7. Detection Method Table

Method	EML	GPR	Typical application (informative)
M1 / M1P	Orthogonal search transect at <10m intervals and when following a utility trace, search transects at <5m intervals	Either: a) Boundary survey incorporating a minimum of 5 survey transects around perimeter of site, spaced not more than 3m apart; or b) <5m orthogonal grid; or c) Multiple antenna array	Used where density of services is typical of an undeveloped area
M2 / M2P	Orthogonal search transect at <5m intervals and when following a utility trace, search transects at <2m intervals	Either: a) <2m orthogonal; or b) Multiple antenna array	Used where the density of services is typical of a suburban area or where the utility services cross a boundary of a survey area
M3P	Orthogonal search transect at <2m intervals and when following a utility trace, search transects at <1m intervals	Either: a) <1m orthogonal; or b) Multiple antenna array	Used where the density of services is typical of a busy urban area or for clearance surveys prior to operations such as borehole/drilling/fencing/tree planting
M4P	Orthogonal search transect at <2m intervals and when following a utility trace, search transects at <0.5m intervals	Either: a) <0.5m orthogonal; or b) Multichannel GPR array with swathes collected in both directions, and gaps between swathes limited to <0.5m; or c) A dual polarized multichannel array with swathes collected in one direction, but ensuring full area coverage is achieved with no	Used where the density of services is typical of a congested city area

		gaps between swaths	
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Note: 'P' indicates post-processing has been included. M1 and M2 can be performed without post-processing but any method above M2 requires post-processing.

3. Survey Outcomes

3.1. Planimetric Information, Metadata and Attribute Data

Planimetric information for this project has been submitted as per the deliverables table set out in section 1.3 of this report.

Metadata provided as part of the deliverables includes:

- Survey date, stated within the submitted drawing title block and within this report (Section 1.3)
- Utility type and quality level, displayed within the line-types generated via SVS Ltd.'s CAD template
- Detection method in accordance with Table 2 of the PAS128:2022 document, specified within the drawing title block and within this report (Section 1.1)

In addition to the above metadata, attribute data is supplied including the following:

- Utilities, excluding drainage: depth (top of utility)
- Drainage: depth to invert, pipe size, flow direction
- Manholes/ Inspection Chambers: cover level, chamber size, depth to invert, depth to top of ducts, duct configuration, duct sizes, inspection chamber depth, condition i.e Flooded, No Visible Ducts (NVD) etc.
- Utility features: condition or elements related to the survey i.e Unable to Trace (UTT), Cut Cables – UTT etc.

The PAS128 quality levels are defined within the PAS128:2022 as the following:

QL-B1 – The utility or service has been located using electromagnetic locating equipment. The electromagnetic field has been confirmed as round. Depth validation confirmed. The location has also been verified with Ground penetrating radar. (Please note both Electromagnetic and Ground Radar have to agree to achieve a B1 status). Tolerances associated with a B1 status are +/- 150mm Horizontally and +/- 15% of the detected depth.

QL-B2 – The utility or service has been located using electromagnetic locating equipment. The electromagnetic field has been confirmed as round. Depth validation confirmed. Or the location has been located with Ground Radar (please note that a B2 status means the utility or service has only been able to be located with either EML or GPR not both). Tolerances associated with a B2 status are +/- 250mm Horizontally and +/- 40% of the detected depth.

QL-B3 – The utility or service has been located using Electromagnetic locating equipment however the locate has been deemed bad or poor, this may occur when the electromagnetic field has been deemed as not being round possibly indicating that there may be other conductors within the ground creating electromagnetic interference or the target

utility may be a poor conductor. If the utility has been located with Ground Radar then the image or reflection that has been received may be poor. Tolerances associated with a B3 status are +/- 500mm Horizontally with no depth information available.

QL-B4 – The utility or service has been unable to be located however is believed to exist, this quality level covers aspects such as assumed routes, historical data and record information. There are no tolerances associated with a B4 status and must be treated with little to no confidence, further investigations with alternative methods may be advised.

3.2. Appraisal of Survey Results Per Service Type

Service Type	Located	Located via
Electric	Yes ☒ No ☐	EML ☒ GPR ☐ Other ☐
Gas	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Water	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
BT	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Foul Drainage	Yes ☒ No ☐	EML ☒ GPR ☐ Other ☒
Surface Water Drainage	Yes ☒ No ☐	EML ☒ GPR ☐ Other ☒
Combined Drainage	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Communications	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Cable TV	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Fibre Optics	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Traffic Signals	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐
Unknown	Yes ☒ No ☐	EML ☒ GPR ☐ Other ☐
Other	Yes ☐ No ☒	EML ☐ GPR ☐ Other ☐

3.2.1. BT

No BT was located on site.

3.2.2. Electric

Four of the five abandoned cottages have mains electric feeds that were traced to them. Unfortunately, locating one of them was unsuccessful, however, there is a mains electric cable that runs past this building before feeding two of the other cottages, so it is possible that this one spurs off to this cottage too. All visible lampposts and street furniture have had electric feeds located to them, including, the pumping station within the trees.

3.2.3. Gas

No BT was located on site.

3.2.4. Water

No water was located on site.

3.2.5. Foul Drainage

All foul drainage within this area ends up at the pumping station and then exiting through a rising main. Unfortunately, this rising main could not be traced via EML and GPR was not achievable due to the overgrowth. There is a lot of damage within the chambers in these foul runs, including silt, root growth, damaged covers, etc.

3.2.6. Surface Water Drainage

Similarly to above, a lot of the surface water runs were damaged from silt, root growth, damaged covers etc.

Routes have been mapped where possible, however often reach an end of trace before an endpoint could be established.

3.2.7. Combined Drainage

No combined drainage were located on site.

3.2.8. Communications

No communications were located on site.

3.2.9. Cable TV

No CATV were located on site.

3.2.10. Fibre Optics

No fibre optics were located on site.

3.2.11. Traffic Signal Cables

No traffic signals were located on site.

3.2.12. Unknown

There were two unknown services located on this site. One that runs from the road to the farm, to the garage attached to one of the cottages; and the other follows an electric before coming to an EOT on both ends.

3.2.13. Other

No other utilities were located on site.

3.3. Appraisal of Desktop Utility Records

Service Type	Service Provider	Were all records shown located?	Comments
BT	Openreach	Yes ☐ No ☐	All records within the survey area are above ground.
Electric	Scottish and Southern	Yes ☒ No ☐	All electric records coming from the substation have been located.

Note: supplied statutory utility records have been overlayed, scaled and rotated onto the supplied/ SVS produced base plan using correlating features. Services/ utilities shown on the records are then traced/ drawn exactly where they

are positioned once overlayed, scaled and rotated. Due to potential inaccuracies associated with statutory utility records generally and the described techniques, the location/ position of all plotted records should be treated as indicative. In some instances, it is possible that SVS have detected a service/ utility shown on the records, but the overlayed, scaled and rotated service/ utility differs significantly* in position to what was detected, in this instance both the detected service/ utility and the service/ utility shown on the records will remain on the drawing. Any services/ utilities shown on the records which were unable to be detected are assigned QL-B4 and plotted within a QL-B4(TFR) line type.

*significantly refers to a 3m+ positional difference between what was detected by SVS and the overlayed, scaled and rotated statutory utility record.

3.4. Site Specific Conditions and Survey Limitations

This site is extremely overgrown and had piles of debris in almost all areas. Many buried manholes were identified where possible; however, not all of these could be located due to being deeply buried, covered in thorns, or underneath debris that was deemed unsafe to move. Images have been attached at the end to show to extents of the overgrowth. Furthermore, the weather was poor for the duration of the site works so the ground was extremely muddy and slippery.

3.5. GPR Buried Features and Obstructions

The GPR was not able to be deployed on this area of site as it was heavily overgrown. The sections that weren't overgrown were extremely muddy due to excessive rainfall.

3.6. Conclusions and Recommendations

There are multiple manholes that were on the topographical survey provided, however, they were not visible on site; it would be beneficial to clear the area of debris and overgrowth in order to easily locate these manholes for a complete utility drawing.

4. Cautionary Notes

1. No utility mapping survey can be considered as a 100% accurate depiction of the sub-surface environment, the use of SVS Ltd's survey drawings does not remove the requirement for the use of safe digging practices, in line with the requirements set out within HSG-47 and current CDM regulations.
2. The survey drawings and report should be read in conjunction with PAS128:2022 Client Specification Guide for underground utility detection, verification, and location.

3. EML & GPR techniques used to obtain the information shown on SVS Ltd. survey drawings can be subject to varying ground conditions. Always Exercise Caution When Excavating. See HSG-47.
4. If the location or depth of services/features is of importance to a project, then it is recommended that discussions are held with SVS Ltd. regarding any possible limitations or anomalies.
5. It is also advised that trial excavations should be undertaken to verify survey results within key areas of importance.
6. Information depicted QL-B4TFR, cannot be guaranteed as it is based on historic utility records or assumed routes which can be inaccurate and incomplete.
7. Depicted service routes may reflect the routes of multiple cables or pipes. It is not always possible to differentiate between buried construction features, utilities, and other subsurface linear features therefore it is possible that some features shown are not utility related, and due to the limitations of electromagnetic techniques all utility identifications should be treated with caution and verified prior to any design/building works.
8. Water and Gas utilities to individual properties are often of a size that cannot be detected using EML or GPR investigation, whenever possible the route has been added from surface evidence (pipe risers, valves, etc), but this should be viewed as a guide only.
9. Unloaded, perfectly balanced or pot ended electric cables may not be detectable using Electromagnetic Locators.
10. Fibre optic cables are often difficult to detect, and commonly access chambers can be locked and thereby made inaccessible by the utility provider. All reasonable efforts have been made to locate these ducts using GPR. Cables not located have been transposed from records.
11. Wherever possible we have attempted to locate the routes of sewers. Issues such as blockages, surcharging, flooding, sedimentation, sewer collapse, root ingress, excessive depth, obstructions, or heavy traffic flow may have affected our ability to obtain meaningful results. In these cases, recommendations have been made for further survey work.
12. All pipe / duct sizes have been recorded from surface inspection or taken from record information and are assumed to be correct, however due to non-entry to chambers, these should be verified before any works commence.
13. The correct identification of the utility types cannot be 100% guaranteed, therefore these should be independently verified prior to use in any design/ building works.
14. Where possible, the ownership of inspection covers has been derived from information on the covers or from cable tags. This does not necessarily mean that they use or are sole users of the apparatus.
15. It is possible that GPR may detect buried features and obstructions beyond utilities. The type of features that can be detected include, but are not limited to voids, foundations, thrust blocks, tanks, chambers, basement extents, ducts (not linked to any street furniture), and reinforced

concrete. Where the purpose of the survey is to identify and record such features, the survey should be undertaken in accordance with BS 5930.

16. All utilities detected by SVS Ltd. should be considered live unless stated or confirmed otherwise by client or service provider.
17. This report is for the private and confidential use of the client for whom the report is undertaken and should not be reproduced in whole or in part or relied upon by third parties for any use whatsoever without the express authority of SVS Ltd.

5. Supporting Images/ Documents



